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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/919,047	07/31/2001	Ramesh Nagarajan	14-11	4255

30594 7590 03/16/2006

HARNESS, DICKEY & PIERCE, P.L.C.
P.O. BOX 8910
RESTON, VA 20195

EXAMINER	
CURS, NATHAN M	

ART UNIT	PAPER NUMBER
2633	

DATE MAILED: 03/16/2006

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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 09/919,047
Filing Date: July 31, 2001
Appellant(s): NAGARAJAN ET AL.

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GROUP 2800

John Curtin
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 28 December 2005 appealing from the Office action mailed 27 July 2005.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

"Just-in-time signaling for WDM optical burst switching networks"; Wei et al.; Journal of Lightwave Technology, Vol. 18, Issue 12, Dec 2000, Pages 2019-2037.

"Just-Enough-Time (JET): a high speed protocol for bursty traffic in optical networks"; Qiao et al.; Technologies for a Global Information Infrastructure, 1997 Digest of the IEEE/LEOS Summer Topical Meetings, 11-15 Aug. 1997, Pages 26-27.

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claims 1, 3-7, 9-15, and 17-21 are rejected under 35 U.S.C. 102(a) as being anticipated by Wei et al. ("Just-in-time signaling for WDM optical burst switching networks"; Wei et al.; Journal of Lightwave Technology, Vol. 18, Issue 12, Dec 2000, Pages 2019-2037).

Regarding claim 1, Wei et al. disclose a method for use in a node of a network during a connection setup between a source node and a destination node, the method comprising the steps of: initiating a cross-connect with an adjacent node, sending a connection setup message, to a next node before the cross-connect is completed, and completing the cross-connect with the adjacent node without waiting for completion of any downstream cross-connects (page 2028, col. 2, line 15 to page 2029, col. 1, line 28).

Regarding claim 3, Wei et al. disclose the method according to claim 1, wherein the network is an optical transport network (page 2019, Abstract).

Regarding claim 4, Wei et al. disclose the method according to claim 3, wherein the cross-connect is selected from the group consisting of an electrical-based cross-connect and a transparent wavelength-based optical cross-connect (page 2021, col. 1, lines 26-48).

Regarding claim 5, Wei et al. disclose the method according to claim 1, wherein the connection setup is a wavelength-based connection setup (page 2021, col. 1, lines 26-48).

Regarding claim 6, Wei et al. disclose a method for use in a node of a network during a connection setup between a source node and a destination node, the connection setup comprising a forward pass of signaling messages from the source node to the destination node and a reverse pass of signaling messages from the destination node to the source node, the method comprising the steps of: initiating a cross-connect with an adjacent node on the forward pass of the connection setup, and sending a connection setup message to a next node before the cross-connect is completed, and checking if the cross-connect was successful on the reverse pass of the connection setup (page 2028, col. 2, line 15 to page 2029, col. 1, line 28, where the SETUP signal initiates a cross-connect on the forward pass and the CONNECT signal, sent on the reverse pass, confirms the cross-connect was successful).

Regarding claim 7, Wei et al. disclose the method according to claim 6, wherein the forward pass and reverse pass of signaling messages occurs out-of-band (page 2019, col. 2, lines 2-8).

Regarding claim 9, Wei et al. disclose a method for use in a node of a network during a connection setup between a source node and a destination node, the method comprising the steps of: sending a connection setup message to a next node before a cross-connect is completed, and performing the cross-connect with a downstream node prior to receipt of a signaling message related to a status of at least one cross-connect operation performed at another downstream node (page 2028, col. 2, line 15 to page 2029, col. 1, line 28).

Regarding claim 10, Wei et al. disclose a method for use in a node of a network during a connection setup between a source node and a destination node, the method comprising the steps of: sending a connection setup message to a next node from an upstream node before a

cross-connect at the upstream node is completed, and responsive to the received connection setup message, executing a cross-connect with a downstream node whereby a cross-connect at the downstream node is initiated (page 2028, col. 2, line 15 to page 2029, col. 1, line 28).

Regarding claim 11, Wei et al. disclose apparatus comprising: a communications interface for providing signaling to a downstream node and for receiving signaling from an upstream node; and a processor, responsive to receipt of a connection setup message sent from the upstream node before a cross-connect at the upstream node is completed, for performing a cross-connect with the downstream node prior to receipt of a signaling message from the downstream node related to a status of at least other cross-connect operation related to the connection setup (page 2028, col. 2, line 15 to page 2029, col. 1, line 28, where the JIT signaling agent is a processor).

Regarding claim 12, Wei et al. disclose the apparatus according to claim 11, wherein the upstream node and the downstream node are in an optical transport network (page 2019, Abstract).

Regarding claim 13, Wei et al. disclose the apparatus according to claim 12, wherein the cross-connect is selected from the group consisting of an electrical-based cross-connect and a transparent wavelength-based optical cross-connect (page 2021, col. 1, lines 26-48).

Regarding claim 14, Wei et al. disclose the apparatus according to claim 11, wherein the connection setup is a wavelength-based connection setup (page 2021, col. 1, lines 26-48).

Regarding claim 15, Wei et al. disclose the apparatus according to claim 11, wherein the signaling occurs out-of-band (page 2019, col. 2, lines 2-8).

Regarding claim 17, Wei et al. disclose apparatus comprising: a communications interface for receiving signaling sent from an upstream node before a cross-connect at the upstream node is completed on a forward pass of a connection setup and receiving signaling

from a downstream node on a reverse pass of the connection setup, and a processor for initiating a cross-connect with the downstream node on the forward pass, and for checking if the cross-connect was successful on the reverse pass (page 2028, col. 2, line 15 to page 2029, col. 1, line 28, where the JIT signaling agent is a processor, and where the SETUP signal initiates a cross-connect on the forward pass and the CONNECT signal, sent on the reverse pass, confirms the cross-connect was successful).

Regarding claim 18, Wei et al. disclose apparatus comprising: a communications interface for receiving a connection setup message sent from an upstream node before a cross-connect at the upstream node is completed; and a processor for executing a cross-connect with a downstream node and for sending, through the communications interface, a connection setup message to the downstream node, whereby a cross-connect at the downstream node is initiated (page 2028, col. 2, line 15 to page 2029, col. 1, line 28, where the JIT signaling agent is a processor and communications interface).

Regarding claim 19, Wei et al. disclose apparatus as in claim 1, wherein the set-up message is sent from an intermediate node (figs. 4 and 5, which show sending the setup message downstream in advance of cross-connect completion for all nodes including the intermediate nodes).

Regarding claim 20, Wei et al. disclose the method as in claim 6, wherein the set-up message is sent from an intermediate node (figs. 4 and 5, which show sending the setup message downstream in advance of cross-connect completion for all nodes including the intermediate nodes).

Regarding claim 21, Wei et al. disclose the apparatus as in claim 9, wherein the set-up message is sent from an intermediate node (figs. 4 and 5, which show sending the setup

message downstream in advance of cross-connect completion for all nodes including the intermediate nodes).

Claims 8 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wei et al. ("Just-in-time signaling for WDM optical burst switching networks"; Wei et al.; Journal of Lightwave Technology, Vol. 18, Issue 12, Dec 2000, Pages 2019-2037) in view of Qiao et al. ("Just-Enough-Time (JET): a high speed protocol for bursty traffic in optical networks"; Qiao et al.; Technologies for a Global Information Infrastructure, 1997 Digest of the IEEE/LEOS Summer Topical Meetings, 11-15 Aug. 1997, Pages 26-27).

Regarding claims 8 and 16, Wei et al. disclose the method and apparatus according to claims 6 and 16, respectively, and disclose forward pass and reverse pass of signaling (page 2028, col. 2, line 15 to page 2029, col. 1, line 28). Wei et al. also discuss in-band signaling (page 2021, col. 2, lines 11-17 and page 2022, col. 1, lines 9-21), but do not elaborate on in-band signaling in their example of JIT signaling. Qiao et al. disclose an implementation of JIT signaling using in-band signaling (page 26, section 2, where the Qiao et al. system is not a WDM system and thus the signaling is in-band, i.e. in the same wavelength). It would have been obvious to one of ordinary skill in the art at the time of the invention that the JIT system of Wei et al. could alternately function using in-band signaling, as taught by Qiao et al., in order to provide packet-switching-like JIT signaling, with the traffic burst durations and optical buffers optimally matched to avoid dropped bursts, to provide the advantage of the short setup time achievable when the control information travels on the same wavelength as the data (i.e. the signaling for one path not requiring setup time for multiple wavelengths).

(10) Response to Argument

A.) The Section 102 Rejections

The applicant argues that SETUP messages in Wei et al. are sent after a cross-connection time has expired (in contrast to the claimed limitation of sending SETUP messages before a previously initiated cross-connect is complete). The applicant argues that Wei et al. Fig. 4 is an example of a SETUP message sent only after a cross-connection time, t_c, is completed.

However, the applicant is incorrect that Fig. 4 depicts a SETUP message sent only after a cross-connection time t_c is completed. In Wei et al. Figs. 2-4, the chronological order of events indisputably proceeds from top to bottom of the figure. Further, distance orientation between nodes is established from the left to the right of the figure. The concept of a SETUP message sent only after a cross-connection time, t_c, is completed applies to Fig. 2a, which shows what Wei et al. consider to be conventional switching. In Fig. 2a, the SETUP message is sent to the adjacent node **after** cross-connection time t_c (this is illustrated in time by the arrow leaving the bottom right corner of the t_c event box in Fig. 2a). **In contrast,** Fig. 4 shows the SETUP message sent **before** t_c (this is illustrated in time by the arrow leaving the bottom right corner of the t_p event box).

Further, Wei et al. disclose initiating an initial cross-connect SETUP ("issuing a command to the fabric controller") while forwarding the SETUP message (page 2029 col. 1, see also page 2023, col. 2). Also, t_c is defined as "the cross-connect switching and stabilization time" (page 2025, col. 1). Initiating a cross-connect SETUP while forwarding the SETUP message is **not** the same as waiting for cross-connect switching and stabilizing to complete and then forwarding the SETUP message. In addition, Wei et al. specifically states (in reference to Fig. 4), "When a WDM switch receives a SETUP message, it will attempt to reserve the

wavelength on the output port and forward the SETUP message to its next hop. Cross-connect setup is performed in parallel with the next hop propagation" (page 2023, col. 2). Considering these disclosures of Wei et al. it is unreasonable to conclude that Fig. 4 depicts a SETUP message being sent only after t_c is completed.

B.) The Section 103 Rejections

The applicant states that "the Office Action admits, Wei et al. do not disclose or suggest such in-band signaling" (meaning in-band signaling used in order to initiate cross-connections). This is not an accurate statement. The statement from the Final Office Action, and from the above ground of rejection of claim 8, is "Wei et al. also discuss in-band signaling (page 2021, col. 2, lines 11-17 and page 2022, col. 1, lines 9-21), but do not elaborate on in-band signaling in their example of JIT signaling". Wei et al. are not silent on using in-band signaling in order to initiate cross-connections, Wei et al. simply do not use in-band signaling in their example of JIT signaling.

Next, the applicant argues that the applicant cannot find any mention of in-band signaling as stated by the examiner, that Qiao et al. do not use the terms "in-band" or "out-of-band", and that Qiao et al. do not disclose the use of the same wavelength for the control (setup) signal and the data signal. However, as stated in the above grounds of rejection of claim 8, "Qiao et al. disclose an implementation of JIT signaling using in-band signaling (page 26, section 2, where the Qiao et al. system is not a WDM system and thus the signaling is in-band, i.e. in the same wavelength)". Qiao et al. do not have to use the exact phrase "in-band" to disclose in-band signaling. The Qiao et al. system is an optical system but is not disclosed as a WDM system (also conceded by applicant on page 16, lines 6-7 of the appeal brief), and is disclosed as separating the setup signal and data signal in time. Qiao et al. state that the "data

burst follows the control packet after an *offset-time, T"* (page 26, section 2). Considering these disclosures, the conclusion is that the Qiao et al. setup and data signals share the same wavelength, and are thus "in-band".

The applicant also argues that the combination of Wei et al. and Qiao et al. is improper, specifically arguing that the combination would require "either (i) that Wei's principle of operation be changed to a non-WDM system, or (ii) that Qiao's be changed to a WDM system". However, the combination does not require either of these conditions. The applicant does not provide any supporting evidence for these requirements besides pointing out that Wei et al. discloses a WDM system and Qiao et al. discloses a non-WDM system. The applicant does not address the specific combination of the rejection which is based on the control signaling teaching of Qiao et al. being applied to Wei et al. on an individual wavelength basis. Applying Qiao et al. to Wei does not require Wei et al. to change to a non-WDM system, and considering the specific combination of the rejection, the idea of requiring the Qiao et al. system to be a WDM system does not even make sense, as WDM is not a consideration in applying Qiao et al. to Wei et al. Further, the principle of operation of Wei et al. is clearly the "Just-In-Time" signaling protocol that enables the data communication to arrive at the optical switch just as the switch has finished switching. The out-of-band signaling disclosed by Wei et al. is one feature of the Wei et al. implementation, and Wei et al. disclose some advantages to out-of-band signaling, but the "just in time" principle of operation does not depend on the out-of-band signaling. And with respect to control signaling as a protocol feature, modifying the control signaling of Wei et al. from out-of-band to in-band does not render control signaling inoperable, nor does modifying this feature render the JIT protocol inoperable. Further, the applicant states in section **VII. (ii)**, page 4, lines 27-29, of the appeal brief, "(other than the inventive concept, path computation, connection setup, cross-connects, and signaling messages in support thereof, are known in the

art and will not be described herein)". From this statement, and considering that neither out-of-band signaling nor in-band signaling is described in the specification or claimed in any of the independent claims, it is reasonable to conclude that the applicant believes that both out-of-band signaling and in-band signaling are not part of the inventive concept and are known in the art.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

Nathan Curs

Examiner

Art Unit 2633

NC

March 7, 2006

JASON CHAN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600

Conferees:

Jason Chan (Examiner's SPE)

Ken Vanderpuye (SPE)

KENNETH VANDERPUYE
SUPERVISORY PATENT EXAMINER